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ILLUSTRATIONS

SUPPORT DOCUMENT FOR DESIGNATION OF THE VASHON-MAURY ISLAND AQUIFER AS A SOLE SOURCE AQUIFER

INTRODUCTION

Purpose

This document summarizes readily available information about Vashon and Maury Islands, and will serve as the technical basis for U.S. Environmental Protection Agency (EPA) designation of Vashon Island as a sole source aquifer.

Sole Source Aquifer Program

The Sole Source Aquifer Program is authorized by the Safe Drinking Water Act of 1974 (Public Law 93-523 42 U.S.C. 300 et seq.). Section 1424(e) of the Safe Drinking Water Act states:

> "If the Administrator determines, on his own initiative or upon petition, that an area has an aquifer which is the sole or principal drinking water source for the area and which, if contaminated, would create a significant hazard to public health, he shall publish notice of that determination in the Federal Register. After the publication of any such notice, no commitment for Federal financial assistance (through a grant, contract, loan guarantee, or otherwise) may be entered into for any project which the Administrator determines may contaminate such aquifer through a recharge zone so as to create a significant hazard to public health; but a commitment for Federal assistance may, if authorized under another provision of law, be entered into to plan or design the project to assure that it will not so contaminate the aquifer."

EPA currently has a longstanding policy of not initiating sole or principal source aquifer designations; the Agency only responds to petitions. Until 1987, EPA accepted sole or principal source aquifer petitions which contained a minimum amount of information. The Sole Source Aquifer Petitioner Guidance Document, released in February of 1987, set forth criteria which clarifies the definition of a sole or principal source aquifer, and describes how to petition EPA. The requirements of the new guidance only apply to petitions submitted after February of 1987. EPA defines a sole or principal source aquifer as one which supplies at least 50 percent of the drinking water consumed in the area overlying the aquifer (U.S. EPA, 1987). Current EPA guidelines also stipulate that designated sole or principal source aquifer areas cannot have an alternative water source or combination of sources which could physically, legally, and economically supply all those who depend upon the aquifer for drinking water. For convenience, all EPA designated sole or principal source aquifers are often referred to simply as "sole source aquifers."

Petition History

On April, 2, 1992, the EPA Region 10 Office received a petition from the Seattle-King County Department of Public Health, requesting that EPA designate the Vashon-Maury Island area as a sole source aquifer (Seattle-King County Health Department, 1992). The petition was developed jointly with the Vashon-Maury Island Ground Water Advisory Committee, the Vashon-Maury Island Water Utilities Coordinating Committee, and the Seattle-King County Health Department. The EPA Office of Ground Water responded to the request and committed to conducting a 30-day review of the petition to determine if it met the requirements of a complete petition and was thereby ready to undergo a detailed technical verification (Mullen, April 14, 1992).

On May 15, 1992, EPA announced completion of the initial review and requested a "Matrix of Current Drinking Water Sources" and copies of two background documents referenced in the SSA petition - Vashon/Maury Island Water Resources Study and Hydrogeology Background Data and Water Use in the Vashon Island Ground Water Management Area (Mullen, May 15, 1992). The requested "Matrix" and background documents were received by EPA on June 12, 1992 (Lasby, June 9, 1992).

On September 3, 1992 EPA identified a minor inconsistency in the "Matrix" that required submission of a revised "Matrix" as well as a matrix of Alternative Drinking Water Sources (Mochnick, September 3, 1992). The revised and alternative matrices were received by EPA on September 29, 1992 (Lasby, September 28, 1992). Other identified inconsistencies resulted in the submission of a revised matrix of Alternative Drinking Water Sources that was received on October 21, 1992 (Lasby, October 21, 1992). The petition was then considered complete, and the technical review began.

On June 14, 1993, EPA responded to a petitioner's inquiry about the status of the petition (Mochnick, June 14, 1993). On June 23, 1993 EPA provided the petitioners with a status report on the petition (Mochnick, June 23, 1993).

GENERAL DESCRIPTION OF VASHON-MAURY ISLAND AREA

Geography

Vashon and Maury Islands are located near the southern end of Puget Sound in the southwestern corner of King County, southwest of Seattle and north of Tacoma (Figure 1). The area lies in the Puget Lowland, a trough between the Olympic Mountains to the west and the Cascade Mountains to the east. Together, Vashon and Maury Islands cover an area of 36.7 square miles, of which 29.7 square miles is Vashon Island and 7.0 square miles is Maury Island. There are approximately forty-seven miles of shoreline. The terrain has steep slopes in many places.

Climate

The Vashon-Maury Island area has a mid-latitude, marine climate with generally cool, dry summers and mild, rainy winters. Summer temperatures average in the 70 degree Fahrenheit range during the day and in the 50 degree range at night. Winter temperatures average 30 degrees cooler during the day and 20 degrees cooler at night (J.R. Carr Associates, 1983).

Twenty-three years of recorded rainfall data indicate an average rainfall of 46.53 inches. Peak precipitation was recorded in December (mean 8.16 inches) with about 35 inches of the total precipitation occurring in the six months from October to March. During the 1981-1982 period, the west side of Vashon Island received about 50% more precipitation than the east side of Maury island.

Population

The Puget Sound Council of Governments estimates the 1987 population at 7,817. Population is presently concentrated in the communities of Vashon, Vashon Heights, Burton and Dockton (Seattle-King County Health Department, 1992).

Economy

Employment in 1980 was 1,248. Of this total, 554 was in the manufacturing sector, 325 in retail trade, 188 in government and education and 150 in services. In 1980 there were 2,894 total households. Of these, 300 were multi-family and the remainder single family (Seattle-King County Health Department).

HYDROGEOLOGY OF VASHON-MAURY ISLAND

The movement and availability of ground water is directly related to the hydrogeologic setting. The following discussion was obtained predominantly from J.R. Carr and Associates,

1983, and summarizes the hydrogeologic features that influence ground water quality and quantity.

Stratigraphy

The aquifer system is composed entirely of interbedded glacial and nonglacial deposits (Figure 2). The uppermost and most recent deposits (Quaternary Vashon unit) are mainly stratified sand and gravel (advance outwash deposits) overlying glacial till and sandy gravel interbedded with medium- and fine-grained sand (recessional outwash deposits). These deposits are about 15,000 years old.

Underlying the Vashon unit are non-glacial deposits mapped as the Quaternary Olympia beds. These strata are generally thin-bedded sand and silt with local layers of gravel, massive silt and clayey silt. In many areas, a lacustrine deposit of clay and silt directly underlies the lowermost Vashon units.

Underlying the Olympia beds are a variety of interbedded Quaternary (Pleistocene) glacial tills, sand and gravel units and laminated silts and clays. These units are not well-exposed and generally lie below mean sea level.

Hydrogeology and Ground Water Movement

The Vashon unit contains the uppermost fresh water aquifer (Principal Aquifer) on Vashon-Maury Island. The Olympia beds serve as a leaky aquitard between the upper Principal Aquifer and the lower Deep Aquifer. The Principal Aquifer is found at an elevation of between 0 and 400 feet above mean sea level. The Deep Aquifer is located at an elevation of between about 100 to 300 feet below mean sea level. About 12 wells on the island produce water from the Deep Aquifer.

J.R. Carr and Associates (1983) divide the Vashon unit into two hydrogeologic units; one a surficial aquifer and the other the Principal Aquifer. Unit I is comprised primarily of glacial till and has poor water-bearing characteristics. Sandy layers within the till provide limited water to shallow dug wells. This unit is responsible for discontinuous perched aquifers which are indicated by steep, isolated ground water mounds delineated on the water table map. Thickness of Unit I ranges from 0 to 150 feet. The unit appears to be thickest along the western side of Vashon Island with a single depocenter exceeding 150 feet in thickness in the north-center of the island.

Carr and Associates' Unit II are the outwash sand and gravel beds that comprise the Principal Aquifer. Thickness of Unit II ranges from 50 to over 400 feet in thickness. The unit appears to be thicker along the western side of the island with a single depocenter exceeding 400 feet on eastern Maury Island.

A water table map of the unconfined Principal Aquifer was constructed from water level measurements taken at 61 wells in the Fall of 1982 (J.R. Carr and Associates, 1983). The data show that in general, ground water moves radially outward from the interior to the shorelines of the Islands. Ground water elevations exceed 300 feet above mean sea level only in three small areas in the north, west-center and southwest arm of the island. In general, the water table elevation reflects the surface topography.

Depth to water was continuously measured during 1981-82 in a well penetrating the Principal Aquifer. The highest water level was recorded in May with the lowest water level in January. The difference between highest and lowest elevation was 13 feet. In contrast, water level variations in the Deep Aquifer did not change by more than one foot for measurements taken in a single well. Precipitation data collected in l981-1982 indicate that the response of the water level to seasonal precipitation is about three months per 50 feet of depth.

Water level elevations in wells decrease with depth of the aquifer horizon in which they are completed and at a given location decrease with well depth. These data indicate that water from shallow aquifers is infiltrating to the underlying deeper aquifers through the intervening sediments (J.R. Carr and Associates, 1983). These measurements are consistent over much of the Island.

Estimated recharge of the Principal Aquifer is approximately 9 million gallons per day. Recharge to the Deep Aquifer is estimated at between 1.73 and 3.46 million gallons per day. It is estimated that the Principal Aquifer is capable of producing about 578 million gallons per year. No estimates are available on the production capability of the Deep Aquifer, but well yields are on the order of 100 to 300 gallons per minute. Recharge to the Principal Aquifer is probably not uniformly distributed. It is probably highest along a north-south corridor of west-central Vashon Island. Calculations suggest that 45% of the recharge occurs over 25% of that area.

Based on calculations for an eight square mile area in the west-central part of Vashon island, it is estimated that 23% of the precipitation infiltrates into the subsurface. In general, it is estimated that, of a total of 40 inches of precipitation, 20 inches is returned via evapotranspiration, 15 inches is direct run-off to the ocean, 4 inches recharges the Principal Aquifer and one inch recharges the Deep Aquifer.

Ground Water Quality

Ground water quality data are available from 72 wells located in the aquifer area (Geraghty and Miller, 1991). Specific conductance values range from 42 to 720 micromhos per centimeter. In general, deeper wells had higher specific conductance values. Ten wells had chloride concentrations greater than 10 milligrams per liter. Chloride content of the remainder ranged from 2 to 8 milligrams per liter. Elevated chloride concentrations were found in near shore wells on the northern and eastern edges of the Island.

One well on Maury Island had nitrate (reported as nitrogen) levels of 27 milligrams per

liter, in excess of the Maximum Contaminant Level (MCL) of 10 milligrams per liter. In general, nitrate concentrations are below two milligrams per liter everywhere on Vashon Island except the far northern tip. Maury Island nitrate concentrations are higher. A significant percentage (about 10-20%) of Maury Island is between two and five milligrams per liter. Iron content of wells ranged from 0.1 to 16.6 milligrams per liter. Twenty-five wells had iron concentration at or above 0.3 milligrams per liter. Twenty wells were sampled for arsenic, cadmium and lead. All values were below the limit of detection. A majority of the ground water samples had a Ph value of less than 6.4. Water from the Deep Aquifer had measured temperatures of 50 to 54 degrees Fahrenheit.

Two private wells are chlorinated as a result of unacceptable total and fecal coliform levels.

Other water quality parameters do not appear to be of concern (J.R. Carr and Associates, 1983).

Water quality trend data are limited, and are not available for water wells. Combined water system and spring data indicate that source water nitrate concentrations show a generally increasing trend. The average nitrate concentrations increased from 1 milligram per liter to 2.5 milligrams per liter between 1967 and 1981.

Potential for Contamination

A combination of natural and man-made factors determine the potential for contamination of an aquifer. Natural factors, attributable to climate and geologic history, include the thickness and nature of the unsaturated zone, depth to ground water, and ground water movement. Qualitative measures of some combination of natural factors is often called "hydrogeologic susceptibility". Man-induced factors include water withdrawal, waste-water disposal, hazardous material handling and disposal practices, and other land-use practices. Qualitative evaluation of man-induced factors combined with hydrogeologic sensitivity is often termed "ground water vulnerability" or "potential for contamination."

Interpretation of the specific conductance and chloride data indicate that shallow wells located near the north shoreline may be affected by sea water intrusion (J.R. Carr and Associates, l983). Nitrate contamination appears to be associated primarily with shallow wells. The very high concentration in one well that is located at a former Coast Guard station is reported to be possibly the result of animal wastes from horse corrals.

The Principal Aquifer is considered to be the most vulnerable unit in the aquifer system. This aquifer supplies ninety-five percent of the ground water wells located on Vashon-Maury Island, and is the more shallow and vulnerable of the two aquifers. Few of the wells producing from this aquifer are deeper than 200 feet below land surface. Using the above estimate of recharge lag time (three months per fifty foot of depth), it is estimated that the conservative contaminant travel time from the surface to the well screen is about one year. Few contaminants

are significantly attenuated in such a short period.

The presence of sand interbeds within the surficial glacial till deposits can allow easier infiltration of contaminants. Although discontinuous, their distribution is sufficiently widespread to make much of the Island vulnerable to contamination of the Principal Aquifer.

Evidence discussed above indicates that the Deep Aquifer receives recharge from the Principal Aquifer. If this observation is valid, then the Deep Aquifer is also vulnerable to contamination from activities occurring on the land surface.

Potential sources of contamination include landfill leachate from the Vashon landfill, on-site sewage disposal systems, leaky sewer lines within the Vashon Sewer District, petroleum products, agricultural chemicals, small hazardous waste generators and improper household, forestry and farm practices. The number and location of improperly located and abandoned wells is not currently known.

DESCRIPTION OF BOUNDARIES

Areal boundaries of the Vashon-Maury Island Sole Source Aquifer are coincident with the shorelines of the islands (Figure 3). The bottom of the lowermost layer of aquifer material represents the boundary of the Sole Source Aquifer at depth. This boundary is assumed, because stratigraphic data are not sufficient to fully map the vertical extent of aquifer material on the island.

DRINKING WATER USE

The area's only publicly-owned water supply well, King County Water District #19, Well No. 1, is completed more than 600 feet below mean sea level and screened from about 197 to 254 feet below mean sea level (608 to 665 feet below surface), presumably in the Deep Aquifer. Its yield averages 150 gallons per minute. Established in 1925, it has over 1000 connections and is the largest water supply system on the island. The District's service area covers approximately six square miles. At least six other, large private water supply systems are operating. The Vashon Community Plan [cited by J.R. Carr and Associates (1983)] reported 83 water companies using 40 wells. Total consumption from wells is 3,332,160 gallons per day.

Most water supply systems use both surface water and ground water to supply their distribution system (Seattle-King County, 1992). It is estimated that 71% of the water supplied to households on the island is from wells, 29% is from surface water sources. The island is about equally divided between Public Water Systems (53%) and private systems (47%).

ALTERNATIVE DRINKING WATER SOURCES

Under EPA's 1987 Petitioner Guidance, an aquifer which serves as the sole or principal source of drinking water for an area may not be designated as such if an alternative source or combination of alternative sources can physically, legally, and economically supply all those who depend upon the petitioned aquifer for their drinking water (EPA, 1987). Aquifers petitioned before 1987 are not subject to this formal alternative source feasibility criteria, but the feasibility of using alternative drinking water sources has long been a consideration in sole source aquifer designation decisions.

There are no alternative sources of drinking water for the Vashon-Maury Island area residents that can be physically, legally, and economically supplied. In 1981, the State of Washington closed the major streams on Vashon-Maury Island (Judd Creek, Jod Creek, Needle Creek, and Fisher Creek) and their tributaries, to any further consumptive appropriation of water. This protection was provided for the preservation and protection of anadromous fish, aesthetics, water quality and recreation (Carr, J.R. and Associates, 1983).

All other water sources are located outside the sole source aquifer area. Distance from the mainland, and depth of Puget Sound surrounding the island preclude any off-island source from being utilized (Seattle-King County Health Department, 1992). Kitsap County, to the west across Colvos Passage, does not have a large public supply that could serve the Vashon-Maury Island area. The public supplies that currently exist adjacent to Colvos Passage have periodic quantity and quality problems. The City of Tacoma, to the south, is currently restricted from supplying new demands. The City of Seattle, to the east, is a potential supplier. However, as is true for all of these sources, the cost of laying a pipe across Puget Sound is prohibitive.

Table 1. Current Drinking Water Sources for the Aquifer Service Area

CONCLUSIONS

An aquifer must supply 50 percent or more of the drinking water consumed over the aquifer area in order to receive EPA designation as a sole or principal source aquifer. The Vashon-Maury Island aquifer system supplies 71% of the water used in the area, and there are no economically feasible alternative sources of drinking water available to area residents. Therefore, Vashon Island meets the criteria for EPA designation as a sole source aquifer under Section 1424(e) of the Safe Drinking Water Act.

Because of the Principal Aquifer's sensitivity to contamination, and the evidence of pumping-induced sea water intrusion, the there exists a potential to contaminate the aquifer and present a public health hazard.

REFERENCES

Carr, J.R. and Associates, 1983, Vashon/Maury Island water resources study, unpaginated.

Geraghty and Miller, Inc., Hydrogeology and background data and water use in the Vashon Island Ground-Water Management Area, 37 p.

Lasby, Bill, Supervisor, Drinking Water and Ground Water Programs, Seattle-King County Department of Public Health, Seattle, Washington, April 2, 1992, letter to William A. Mullen, Chief, Office of Ground Water, U.S. Environmental Protection Agency, Seattle, Washington.

Lasby, Bill, Supervisor, Drinking Water and Ground Water Programs, Seattle-King County Department of Public Health, Seattle, Washington, June 12, 1992, letter to William A. Mullen, Chief, Office of Ground Water, U.S. Environmental Protection Agency, Seattle, Washington.

Lasby, Bill, Supervisor, Drinking Water and Ground Water Programs, Seattle-King County Department of Public Health, Seattle, Washington, September 29, 1992, letter to Roger K. Mochnik, Chief, Ground Water Section, U.S. Environmental Protection Agency, Seattle, Washington.

Lasby, Bill, Supervisor, Drinking Water and Ground Water Programs, Seattle-King County Department of Public Health, Seattle, Washington, October 21, 1992, letter to Roger K. Mochnik, Chief, Ground Water Section, U.S. Environmental Protection Agency, Seattle, Washington.

Mochnik, Roger K., Chief, Ground Water Section, U.S. Environmental Protection Agency, Seattle, Washington, September 3, 1992, letter to Bill Lasby, Supervisor, Drinking Water and Ground Water Programs, Seattle-King County Department of Public Health, Seattle, Washington.

Mochnik, Roger K., Chief, Ground Water Section, U.S. Environmental Protection Agency, Seattle, Washington, June 14, 1993, letter to Dan Chasan, Chairman, Vashon Groundwater Committee, Vashon Island, Washington.

Mochnik, Roger K., Chief, Ground Water Section, U.S. Environmental Protection Agency, Seattle, Washington, June 23, 1993, letter to Bill Lasby, Supervisor, Drinking Water and Ground Water Programs, Seattle-King County Department of Public Health, Seattle, Washington.

Mullen, William A., Chief, Office of Ground Water, U.S. Environmental Protection Agency, Seattle, Washington, May 15, 1992, letter to Bill Lasby, Supervisor, Drinking Water and Ground Water Programs, Seattle-King County Department of Public Health, Seattle, Washington.

Mullen, William A., Chief, Office of Ground Water, U.S. Environmental Protection Agency, Seattle, Washington, April 14, 1992, letter to Bill Lasby, Supervisor, Drinking Water and Ground Water Programs, Seattle-King County Department of Public Health, Seattle, Washington.

Seattle-King County Health Department, 1992, Vashon-Maury Island sole source aquifer designation petition, 49 p.

U.S. Environmental Protection Agency, 1987, Sole source designation petitioner guidance: Office of Ground-water Protection, 30 p.

Figure 1. Location of the Vashon-Maury Island Sole Source Aquifer Area

Figure 2. Generalized Surficial Geology of Vashon-Maury Island

ENVIRONMENTAL PROTECTION AGENCY

[FRL- -]

Sole Source Aquifer Designation of Vashon Island Aquifer, King County, WA

AGENCY: Environmental Protection Agency

ACTION:

SUMMARY: Pursuant to section 1424(e) of the Safe Drinking Water Act, the Region 10 Administrator of the U.S. Environmental Protection Agency (EPA) has determined that the Vashon Island aquifer is the principal source of drinking water for the designated area, and that the aquifer system, if contaminated, would create a significant hazard to public health. As a result of this determination, all federal financially-assisted projects proposed in the designated area will be subject to EPA review to ensure that they do not create a significant hazard to public health.

EFFECTIVE DATE:

ADDRESSES: The information upon which this determination is based is available to the public and may be inspected during normal business hours at the main and satellite branches of the King County Library System, and at the EPA Library, 10th Floor, Park Place Building, 1200 Sixth Avenue, Seattle, Washington 98101.

FOR FURTHER INFORMATION CONTACT:

Scott E. Downey, Environmental Protection Specialist, Ground Water Section, WD-133, U.S. Environmental Protection Agency, Region 10, 1200 Sixth Avenue, Seattle, Washington 98101

SUPPLEMENTARY INFORMATION:

Notice is hereby given that pursuant to Section 1424(e) of the Safe Drinking Water Act (42 United States Code, 300f, 300h-3(e), Pub. L. 93-523), the Region 10 Administrator of the U.S. Environmental Protection Agency has determined that the Vashon Island Aquifer is the principal source of drinking water for the designated area, and that the aquifer system, if contaminated, would create a significant hazard to public health. As a result of this determination, all federal financially-assisted projects proposed in the designated area will be subject to EPA review to ensure that they do not create a significant hazard to public health.

The information upon which EPA is issuing this _____ determination has been summarized in the "Support Document for Sole Source Aquifer Designation of the Vashon Island Aquifer", EPA 910/R-94-001, prepared by the EPA Region 10 Ground Water Section.

I. Background

The Sole Source Aquifer Program is authorized by the Safe Drinking Water Act of 1974 (Public Law 93-523 42 U.S.C. 300 et seq.). Section 1424(e) of the Safe Drinking Water Act states:

> "If the Administrator determines, on his own initiative or upon petition that an area has an aquifer which is the sole or principal drinking water source for the area and which, if contaminated, would create a significant hazard to public health, he shall publish notice of that determination in the Federal Register. After the publication of any such notice, no commitment for federal financial assistance (through a grant, contract, loan guarantee, or otherwise) may be entered into for any project which the Administrator determines may contaminate such aquifer through a recharge zone so as to create a significant hazard to public health; but a commitment for federal assistance may, if authorized under provision of law, be entered into to plan or design the project to assure that it will not so contaminate the aquifer."

EPA defines a sole or principal source aquifer as one which supplies at least 50 percent of the drinking water in the area overlying the aquifer. Current EPA guidelines also stipulate that these areas can have no alternative drinking water source(s) which could physically, legally, and economically supply all those who depend upon the aquifer for drinking water. For convenience, all EPA designated sole or principal source aquifers are usually referred to simply as "sole source aquifers". Although EPA has the statutory authority to initiate sole source aquifer designation, the Agency has a longstanding policy of acting only in response to petitions. These petitions may be submitted to EPA by any individual of organization and must document and meet all designation criteria as outline in the "Sole Source Aquifer Designation Petitioner Guidance", EPA 440/6-87-003.

On April, 2, 1992, the EPA Region 10 Office received a petition from Bill Lasby, Supervisor, Drinking Water and Ground Water Programs, Seattle-King County Department of Public Health. The petition was developed jointly with the Vashon-Maury Island Ground Water Advisory Committee, the Vashon-Maury Island Water Utilities Coordinating Committee, and the Seattle-King County Health Department. The petition requested EPA designation of the "Vashon Island Aquifer", an area of approximately 36 square miles in King County in the State of Washington. On May 15, 1992, EPA announced completion of the initial review and requested a "Matrix of Current Drinking Water Sources" and copies of two background documents referenced in the SSA petition - Vashon/Maury Island Water Resources Study and Hydrogeology Background Data and Water Use in the Vashon Island Ground Water Management Area. The requested "Matrix" and background documents were received by EPA on June 12, 1992. On September 3, 1992 EPA identified a minor inconsistency in the "Matrix" that required submission of a revised "Matrix" as well as a matrix of Alternative Drinking Water Sources. The revised and alternative matrices were received by EPA on September 29, 1992. Other identified inconsistencies resulted in the submission of a revised matrix of Alternative Drinking Water Sources that was received on October 21, 1992. On June 14, 1993, EPA responded to a

petitioner's inquiry about the status of the petition. On June 23, 1993 EPA provided the petitioners with a status report on the petition.

II. Basis for Determination

Pursuant to section 1424(e) of the Safe Drinking Water Act, the Region 10 Administrator of the U.S. Environmental Protection Agency (EPA) has determined that the Vashon Island aquifer is the principal source of drinking water for the designated area, and that the aquifer system, if contaminated, would create a significant hazard to public health. Based on information available to this Agency, the Regional Administrator has made the following findings which are the bases for the determination noted above:

1. The Vashon Island Aquifer supplies approximately 71% of the average drinking water demand for the area.

2. No alternative source or combination of sources can physically, legally, and economically supply all those who depend upon the aquifer for drinking water.

3. Based upon these two findings, contamination of the Vashon Island Aquifer would create a significant hazard to public health.

III. Description of the Vashon Island Aquifer

Note: Some information in this section represents an unfootnoted summary from the "Support Document for Sole Source Aquifer Designation of the Vashon Island Aquifer", EPA 910/R-94-001, prepared by the EPA Region 10 Ground Water Section.

The EPA technical review determined that the Vashon Island Aquifer consists primarily of unconsolidated sediments deposited by glaciers and associated meltwater during the Quaternary Period. Ground water originates entirely as precipitation upon the land surface. Recharge to the aquifer is greatest where the precipitation falls on permeable glacial outwash sediments such as sand or gravel especially on the west side of the Island where precipitation is greatest. The ground water moves radially toward the island shoreline. Locally the direction and gradient of ground water movement can vary from the overall trend.

Depth to the water table varies from zero to about 100 feet. Ground water occurs at or near the land surface in discharge areas and where materials with low permeability, such as glacial till (an unsorted assemblage of clay, silt, sand, pebbles, cobbles, and/or boulders), restrict recharge during the wet season. Seasonal variations in water table elevations of 13 feet have been observed in some parts of the aquifer system.

Deep wells drilled within the Island penetrate a productive aquifer of permeable glacial outwash that is separated from the overlying aquifer by a layer of clay and silt deposited in a glacial lake. The degree of hydrologic connection between the upper and lower aquifer can vary greatly. Ground water discharge occurs to surface water bodies, wetlands and to the surrounding ocean water. Ground water from the aquifer is naturally low in dissolved solids and can normally be used for drinking.

The natural sensitivity of the aquifer system to contamination is influenced by the permeability of geologic materials that overlie the aquifer system, the amount of recharge for precipitation, and the depth to ground water. The potential for contamination is greatest where sediments are permeable, recharge is high, and ground water is shallow.

The relative vulnerability of ground water to contamination increases from various human activities which provide the opportunity for anthropogenic sources of contamination to enter the system. Subsurface disposal of waste and wastewater is the chief threat to ground water quality over much of the aquifer system. Principal concerns are individual and community septic systems, petroleum products and a solid waste landfill. Although concentrations of nonpoint contaminants are still generally below drinking water standards, there are instances of overly high values and nitrate concentrations have increased over time throughout parts of the aquifer.

The sole source aquifer boundary selected by EPA is the shoreline of Vashon Island.

The petitioner estimates that more than 7,000 people live within the aquifer boundary. Ground water generally supplies about 71% of the drinking water used within the designated area. The petitioner and EPA have determined that although alternative sources of drinking water are physically available, they cannot physically, legally and economically serve all those who now depend on the aquifer.

IV. Project Reviews

Designation of a sole source aquifer authorizes EPA to review, at the Agency's discretion, federal financially-assisted projects proposed within the designated area. The principal mechanism used by EPA Region 10 to identify projects for review are Memorandums of Understanding (MOUs) with federal funding agencies. These MOUs stipulate procedures for screening and referring projects to EPA in order to ensure that only projects which may have a significant impact to ground water quality are reviewed. Should the EPA Administrator determine that a project may contaminate an aquifer through its recharge zone so as to create a significant hazard to public health, no commitment for federal financial assistance may be entered into.

EPA also learns of and coordinates the review of proposed projects with other offices within EPA and with various federal, state, local, and tribal agencies that have a responsibility for ground water quality protection. Information obtained from such sources is given full consideration in the sole source aquifer review process. Through such coordination, EPA project reviews can complement, support, and strengthen existing ground water protection mechanisms.

V. Public Comments

VI. Summary

Today's action affects only the Vashon Island Aquifer located in the State of Washington.

This action provides a review process that allows ground water quality protection measures to be incorporated into federal financially-assisted projects.

Regional Administrator, U.S. Environmental Protection Agency, Region 10
[FR Doc. 94- Filed]

SOLE SOURCE AQUIFER FACT SHEET

VASHON ISLAND AQUIFER
KING COUNTY, WASHINGTON

Background

The Safe Drinking Water Act of 1974 authorizes EPA to designate aquifers which serve as the "sole or principal source" of drinking water for an area.

EPA guidelines require that these areas have no feasible alternative drinking water sources which could replace consumption from the aquifer.

Following a Sole Source Aquifer designation, proposed federal financially-assisted projects over the aquifer are subject to EPA review to ensure that they do not create a significant hazard to public health.

Key Specifics

EPA Region 10 received a petition from the Seattle-King County Department of Public Health on April 2, 1992, which requested EPA to designate the Vashon Island Aquifer as a Sole Source Aquifer.

The Vashon Island Aquifer consists primarily of unconsolidated sediments deposited by glaciers and associated meltwater. The ground water moves radially outward from the interior of the island toward the shoreline.

More than 7,000 people live on the Island.

Ground water from the Vashon Island Aquifer supplies about 71% of the drinking water used.

At present, the quality of drinking water supplied by the aquifer is generally good, but some contamination has occurred and the trend for at least one contaminant is that of gradually decreasing water quality.

If water in the Vashon Island Sole Source Aquifer were to become unfit to drink, there are insufficient alternative sources of drinking water available.